

Thermophysical Properties of Superheated Liquids

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In this unique the principal problems of the statistical theory of phase metastability are described. A superheated liquid is a particular case of metastable phase state that is most convenient for experimental studies. The low viscosity of superheated liquid guarantees a quick relaxation of its structure, which is not always true in the case of undercooled liquid. We describe the results of experimental studies into the thermodynamic and kinetic properties of simples superheated liquids: p , ρ , T - properties, isochoric heat capacity, velocity of sound, ultrasonic absorption coefficient, and bulk viscosity. The resultant data clearly demonstrate that both the thermodynamic potential and its first and second derivatives with respect to pressure are continuous on the phase equilibrium curve and smoothly extend to the region of superheated states. The values of thermodynamic properties at the line of attainable superheats have been determined. The theory of phase metastability and the results of studies into the thermodynamic and kinetic properties of superheated liquids are dealt with comprehensively, while problems relating to the construction of the equation of state, description of the thermodynamic properties, and approximation of the spinodal of metastable liquid are also discussed.